

**ABSTRACT OF THE DISCLOSURE**

The present invention is generally directed to a method of using scatterometry measurements to control the photoresist etch process. In one embodiment, the method comprises forming at least one grating structure in a layer of photoresist material, the grating structure being comprised of a plurality of photoresist features of a first size, and performing an etching process on the photoresist features of the grating structure to reduce the photoresist features to a second size that is less than the first size. The method further comprises illuminating the grating structure, measuring a phase and intensity of spectroscopic light reflected off of the grating structure after the etching process is started to generate an optical characteristic trace for the grating structure, comparing the generated optical characteristic trace to a target optical characteristic trace that corresponds to a grating structure comprised of a plurality of photoresist features having a desired profile, and stopping the etching process based upon the comparison of the generated trace and the target trace.